OBSERVATIONS ON THE HABITS AND LIFE HISTORY OF THE MOTH—LOPHOPTILUS ELOISELLA

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The lavernid moth, *Lophoptilus eloisella,* has been known to be associated with the evening primrose since 1875, when Chambers gave it the specific name of "*oenotheraella.*"[1] Miss Murtfeldt, however, was the first one who really made any very detailed observations upon its life history. She described the larva and its general habits, the pupa and its period of pupation.

The yellow larvæ of this moth are found in great numbers inside the stem of the evening primrose at Ithaca, N. Y., where I collected them in the late winter of 1925–26. Practically every stem which was opened had at least one of these larvæ in the pith. One stem had thirteen in its extent. Usually one finds three to four.

They are found as a general rule in the pith cavity of the middle half of the stem, and only occasionally are they found in the thicker and much woodier lower fourth of the stem, or the upper part where the spikes of flowers arise.

One finds the larvae in the pith in September and October. At this time or a little later, each has already eaten practically all the pith in its neighborhood for a length of 0.8 cm. to 2.2 cm., but the usual distance so cleared is about 1 cm. The larva cleans this area thoroughly, and builds up at each end more or less of a cone-shaped pile of frass, stuck together with silk. The bases of the cones, facing one another, form the inside boundaries of the little chamber so constructed by the larvæ, and the apices of the cones are directed into the undisturbed pith. The disks or bases of the cones are lined by a very fine layer of silk, as are also the sides of the cylindric chamber, later on.

[1] Canad. Ent., Vol. VII. Pp. 30 and on. 1875.

During the months of March or April, depending upon the temperature, the larvæ become much more active. A second layer of silk, denser than the first, and inside of it, is spun about the chamber. A little hole is cut through the wall of the stem as far as the cuticle, at the upper end of the chamber. The silk lining of this chamber is extended into and also lines this hole and the chips are imbedded in the silk on its upper side.

Then the larva proceeds to weave about itself a cocoon of very closely matted silk (Fig. 2, B), in which the later formed pupa seems to be suspended. During pupation the head capsule of the larva is shifted and finally caught in the lower part of the cocoon. This third layer of silk is extended above through the exit hole before described, so that the imago may pass immediately to the exterior when the cuticle is ruptured.

Pupal Stage.—(Fig. 1, C; Fig. 2, B.) The pupæ kept in the laboratory emerged after about two weeks. Those in the field had a period of pupation of about forty days during the summer of 1926. The early part of the summer, however, was unusually cool, and probably ordinarily Miss Murtfeldt's estimate of about twenty to twenty-five days is a better average.

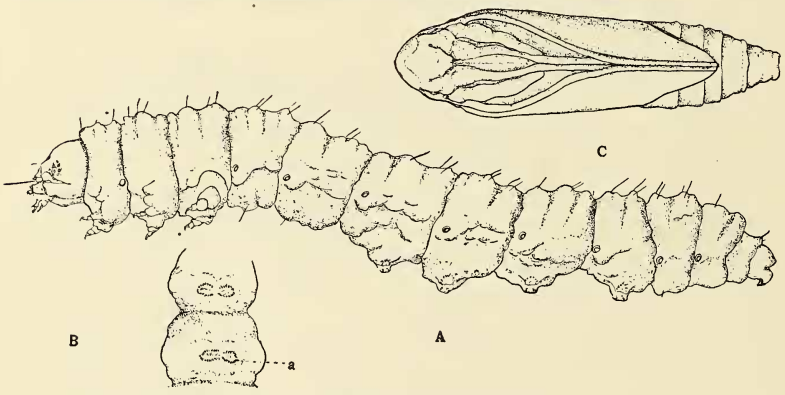

FIG. 1. A. Lateral aspect of caterpillar of *Lophoptilus eloisella*—just before pupation. B. Ventral aspect of the third and fourth abdominal segments of the caterpillar, (a) abdominal prolegs showing arrangement of chitinous hooks. C. Ventral aspect of pupa (specimen was preserved in alcohol, so is contracted somewhat).

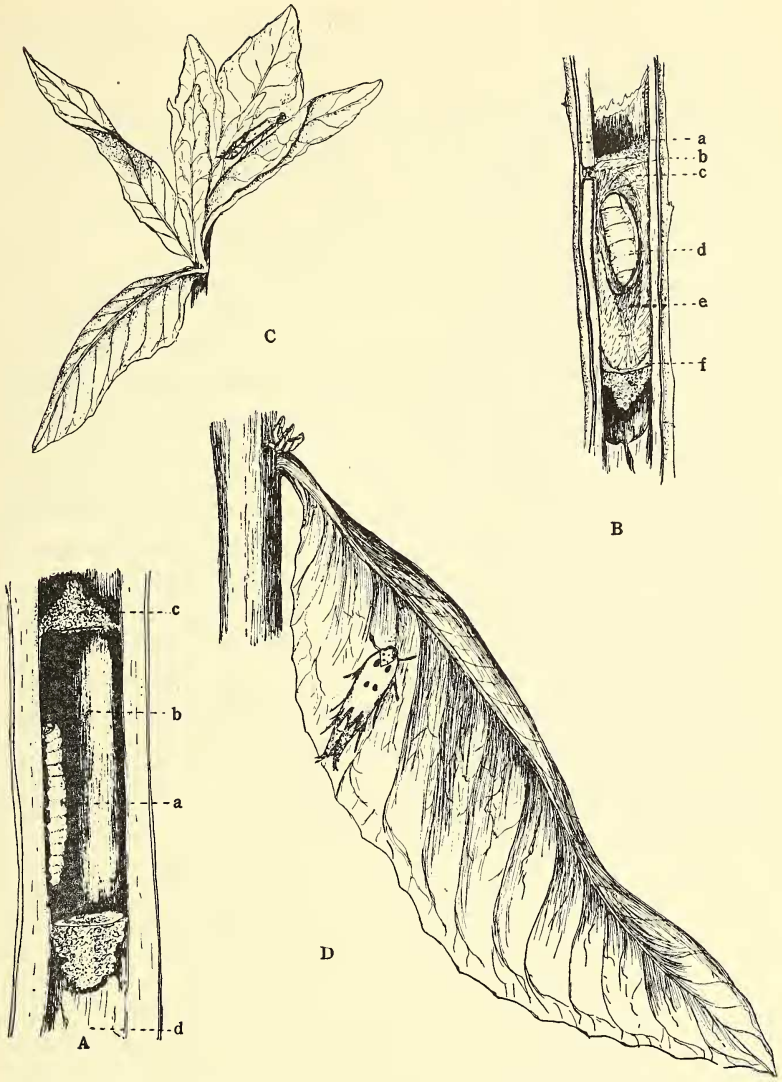

FIG. 2. A. Longitudinal section of a portion of a stem of the evening primrose, showing caterpillar (a), in its chamber (b), (c) frass pile, (d) solid pith. B. Another section showing pupa suspended in its cocoon; (a) cuticle of stem; (b) exit hole for imago; (c) middle layer of silk; (d) pupa (the three layers of silk cut away); (e) inner layer of cocoon; (f) outer layer of silk. C. Tip of stem of evening primrose, with lateral view of imago, recently emerged. D. Leaf of evening primrose, with imago of *Lophoptilus eloisella*, in characteristic resting position.

In 1926, at Ithaca, I found the larvæ, and later the pupæ were very heavily parasitized. Not more than one half of the larvæ brought in from the field emerged as imagoes.

The first of these parasites to appear is the ichneumonid *Epiurus pterophori* Ashmead. Then followed: *Epiurus pterophori* Ashm.,[2] *Eurytoma tylodermatis* Ashm.,[2] *Chelonus fissus* Prov.,[2] *Bassus gibbosus* Say[3] and an undescribed species of *Orgilus*.[3].

In addition, there is the mite *Tyroglyphus lintneri* which was found to be feeding upon the larva as it was constructing its silk layers.

By the middle of August (of the year 1926) the young larvæ were found boring in the stems. Quite a range in size was noticeable at this particular time, and of course the length and size of the burrow varied accordingly.

It was possible to locate the point of entrance of the larva by following the burrow as it diminished in size. In all cases it was found that the larva followed the vascular system of a leaf into the stem. In several cases the writer traced the tiny burrow to the exterior—along the midrib of a leaf on its upper surface.

Not only were the lepidopterous larvæ found in the stems at this time, but also the larvæ of at least two parasites were inhabiting the pith. In several cases, the moth larva had been killed already by the parasite which had invaded its burrow.

[2] Kindly determined for me by R. A. Cushman.

[3] Kindly determined for me by A. B. Gahan.